



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification⁶:

H04N 1/00, 1/32

A1

(11) International Publication Number:

WO 97/18665

(43) International Publication Date:

22 May 1997 (22.05.97)

(21) International Application Number: PCT/US96/17259

(22) International Filing Date: 12 November 1996 (12.11.96)

(30) Priority Data:

08/555,911

13 November 1995 (13.11.95) US

(71) Applicant: NETFAX INCORPORATED [US/US]; Suite 2200,
One Kendell Square, Cambridge, MA 02139 (US).(72) Inventor: MURPHY, Frederick, J.; 259 Beacon Street, Boston,
MA 02116 (US).(74) Agents: PETERSON, Thomas, L. et al.; Banner & Witcoff,
Ltd., 11th floor, 1001 G Street, N.W., Washington, DC
20001-4597 (US).

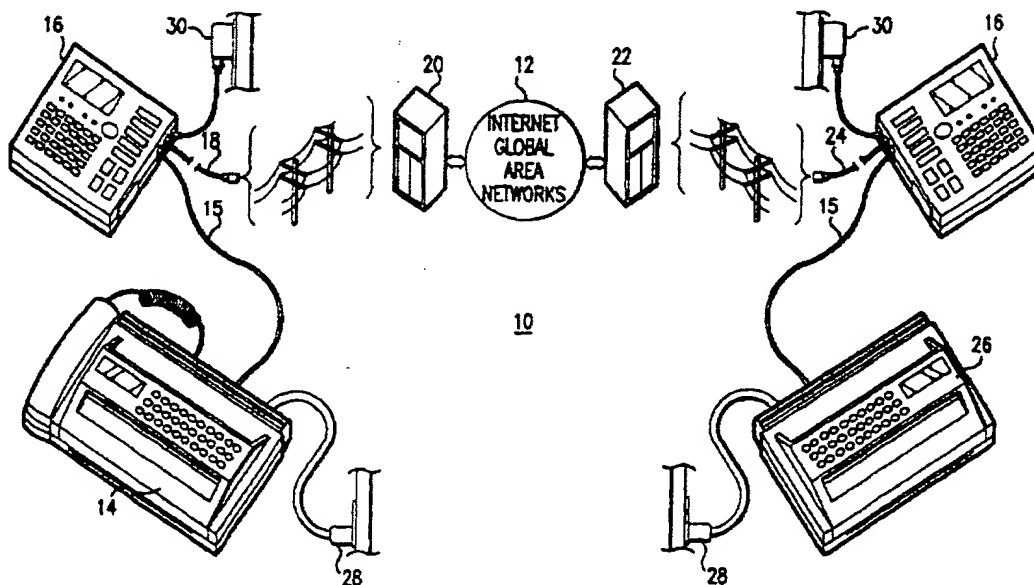
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR,
BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE,
HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS,
LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL,
PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA,
UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB,
GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ,
CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published

With international search report.

jc841 U.S. 09/767339
01/22/01

(54) Title: INTERNET GLOBAL AREA NETWORKS FAX SYSTEM



(57) Abstract

A method and apparatus for transmitting class 1, 2, or 3 facsimile image data over Internet Global Area Networks is shown. A first device (16) converts facsimile image data from a local facsimile machine (14) into electronic mail format data and transmits the electronic mail format data over a network (12) to a second remote device (16) which converts the electronic mail format data to facsimile image data for print out by a remote facsimile machine (26) connected thereto.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

INTERNET GLOBAL AREA NETWORKS FAX SYSTEM

This invention relates to a method and apparatus for transmitting facsimile images over remote networks and more particularly to an apparatus and method for transforming, transmitting, and receiving conventional class 1, 2, and 3 fax images and for receiving other electronic data on common class 1, 2, and 3 fax machines over Internet global area networks.

BACKGROUND OF INVENTION

In recent years the so called "Fax" machine has become a common device in businesses both large and small and also in many homes. In 1966 the so called Group or Class 1 standards were adopted and with that came the start of the present popularity of the device. Although it took about six minutes to transmit a single page and the resolution was poor it was a big improvement over mail especially for international communications. In 1978 Class 2 standards appeared followed in 1980 by the Class 3, which machines were much faster and had much better resolution. These latter machines take about 30 seconds to transmit a page of text.

Ubiquitous physical stand alone fax machines remain the norm today for every day transmission of written documents and images but lack the ability to directly connect to and send/receive such documents across Internet global area networks.

PRIOR ART

While fax machines are now thought of as universal all class 1,2,and 3 machines are currently direct telephonic connection devices and as such acquire toll charges for their use over the telephone companies switches. This of course means that the sender must pay intrastate and interstate long distance toll charges for the time it takes to transmit the desired communication, which in a busy office can amount to hundreds of dollars a month and in an international company to many thousands of dollars. Today's

common fax machines cannot communicate directly over Internet global area networks nor can they receive electronic mail. Security of Internet Global Area Networks communications also is currently difficult to achieve and insure. The ability to definitively verify the identity of the sender of a fax transmission is often difficult if not impossible to achieve. Also if absolute security is required expensive encryption/decryption devices must be employed to communicate by fax over public telephone lines. Secure private lines can be used but are expensive and limited in the addresses that can be accessed.

The ability to choose when to receive fax transmissions and to decide which ones to print and which ones to discard is not readily available to the average fax user. Negotiating fax transmissions, particularly on a multi use single telephone line, often requires ancillary communications to achieve; i.e. telephone call to agree on when to "turn on the fax machine", priority, re-transmission on "busy", undeliverable, etc.

OBJECTS AND SUMMARY OF INVENTION

Accordingly it is an object of the present invention to provide a method and apparatus that overcomes these limitations of the prior art.

It is another object of the present invention to provide a method and apparatus for transmitting/receiving class 1,2,and 3 fax images over Internet Global Area Networks.

It is another object of the present invention to provide a method and apparatus for transmitting/receiving standard class 1,2,and 3 fax images over the Internet.

It is another object of the present invention to provide a method and apparatus for transmitting/receiving class 1,2, and 3 fax images in a highly secure and private manner.

It is a further object of the present invention to provide an economical device that can be easily connected to present class 1,2,and 3 fax machines and that will enable

them to communicate over Internet global area networks.

It is a further object of the present invention to provide an economical device that can be easily connected to present class 1,2,and 3 fax machines that provides a built in electronic mail agent and means for converting the fax image data stream to e-mail SMPT/MIME/MOSS format for transmission/reception over the Internet Global Area Networks.

It is a further object of the present invention to provide a device that can easily be connected to class 1, 2, and 3 fax machines that allows e-mail to be printed out thereon.

It is a still further object of the present invention to provide a device that can be easily connected to standard class 1,2,and 3 fax machines to convert the fax image data stream to e-mail format for transmission/reception with similarly equipped fax machines and e-mail capable computer terminals over the Internet.

These and other and further objects of the present invention are accomplished in one embodiment of the present invention by a device having signal recognition means, a data store and forward buffer, conversion means, an electronic mail agent, management and output means, encryption/decryption means, and software for accomplishing the desired transmission of fax images over Internet Global Area Networks.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a pictorial view of a system according to the present invention;

Figure 2 is a functional block diagram of the system of Figure 1;

Figure 3 is a detailed block diagram of the "user ecom" block of Figure 2;

Figures 4-7 are flow diagrams of the various operational modes of the present invention;

Figure 8 is a detailed block diagram of an embodiment of the present invention showing the functional components

thereof; and

Figure 9 is a view of a keypad for controlling and operating the present invention.

DESCRIPTION OF INVENTION

5 Referring now to Fig. 1 there is shown a system 10 for transmitting/receiving a fax over the Internet Global Area Networks 12. A local fax machine 14 is connected by line 15 to a signal manipulation device 16 which is in turn connected to a plain old telephone(POTS) line 18 which is
10 terminated in an electronic mail agent server 20 such as a commercial or public server which in turn is connected to or resident on the Internet Global Area Network 12. A remote electronic mail agent server 22 resident on the Internet Global Area Networks 12 at a remote location is connected
15 over a POTS line 24 to another device 16 which in turn is connected to a remote fax machine 26 by another line 15. Fax machines 14 and 26 can be any class 1, 2, or 3 fax machines currently available on the market and are connected to the usual domestic power source at 28. Devices 16 have
20 their own power supplies 30 which convert the usual 110 volt AC power to the appropriate voltages to power the various components within the devices 16 as will be described in detail herein.

Figure 2 shows in block diagram form the system of Fig. 1 along with a privately accessible address book of public
25 encryption keys 32 which may be accessed by direct dial up phone lines 34. In addition to the remote device 16 and fax machine 26 the remote agent server 22 may be connected by POTS line 36 to a modem 38 and computer 40 which can store and display the data stream available in the agent server
30 22.

Referring now to Fig. 3 the signal manipulation device 16 is shown in detailed block diagram form. As will be described herein device 16 takes the fax image data stream and converts it into an e-mail compatible format for
35 transmission over the Internet 12. Device 16 will henceforth be called 'ecom' 16. This, along with the

necessary management of the entire procedure, is accomplished in one embodiment by the device of Fig. 3.

When fax machine 14 initiates a call the ecom 16 responds as if it were the remote fax machine called by fax 14. The usual handshake and identification information is exchanged by recognition box 42 and when confirmed passed to the store and forward buffer 44. From here the data stream will be sent to the various other functions within ecom 16 in accordance with the instructions in box 42. Data compression/decompression is usually accomplished while the data is in buffer 44 also. Next the native facsimile data stream is converted into electronic mail (e-mail) format in box 46. Image compression including JPEG, GIF, and TIFF; audio and video compression such as MPEG; and e-mail extender such as MIME/MOSS are also accomplished, if desired, at this time. If encryption is indicated the converted data stream is directed to encryption/decryption block 48 for coding as will be described later. If coding is not indicated the data stream is passed to electronic mail agent 50 which performs store/send/user/password identification functions as necessary to interface with the selected server 20. Electronic mail agent 50 preferably is a commercial mail agent but it may be any public or private mail agent. In one embodiment both commercial and public electronic mail agents are provided.

As may be seen in Figs. 8 and 9, a keypad 52 is provided to input special instructions, address information and status information such as " e-mail waiting" and the like. From box 52 the converted and formatted data stream is passed to box 54 for final mail agent server phone numbers, send/receive and connect signal functions. The data stream is then ready to be sent dynamically to the selected local agent server 20 resident on the Internet Global Area Networks over a POTS line 18.

From this point on the data stream is under the control of the usual global network servers, managers, and providers until it reaches its destination at the remote ecom 16

connected to the addressed remote fax machine 26. The flow diagram shown in Fig. 4 illustrates this sequence of operations.

While I have shown the ecom 16 connected to the server
5 20 by a telephone line any transport mechanism can be used to transmit the data stream to/from the Internet Global Area Network server including cellular, satellite, microwave and broadcast.

In the event encryption is indicated the converted data
10 stream is routed through box 48 from box 46 and then to electronic mail agent 50. The flow diagram in Fig. 5 illustrates this sequence.

Referring now to Figs. 2 & 6 there is shown another
embodiment of the present invention where the local fax
15 machine 14 can transmit an image to a remote computer. In this configuration since the converted data stream received at server 22 is in e-mail format it can be sent directly to a computer 40 which with the proper modem can store, display and print out the transmitted document.

Figure 7 is a flow diagram of a still further
20 embodiment of the present invention in which it is only desired to encrypt a conventional fax transmission. In this configuration the ecom device 16 processes, converts, and encrypts the data stream but then bypasses the agent and
25 sends the signal directly to the POTS line which is also connected to the remote ecom 16 and fax machine 26. The data stream is received by the remote ecom which decrypts it and prints it out on the remote fax machine.

Figure 8 is a schematic block diagram of the ecom 16
30 showing the general layout and interconnection of the various components making up the ecom 16. Lines 15 from the physical stand alone fax machines 14 and 26 are connected to the bus 60 in ecom 16. Bus 60 connects all of the components together and to the output POTS lines 18 or 24.
35 Modems 62 and 84 serve as input and output modems during transmission and the reverse for reception of data. CPU 72 contains the instruction sets needed to run the ecom and may

be a 386DX/33MHz chip. ASIC chip 64 along with EPROM 68 contain the software instruction sets for the CPU and the TCP/IP,SMTP,MTA protocols and the algorithms for converting the class 1, 2, and 3 fax data stream(Phase C11 data) into commercial and/or public electronic mail format. EPROM 70 is a mail user agent that contains the commercial and/or public mail boxes and EPROM 66 is a flash EPROM containing the encryption/decryption algorithms. RAMS 74, 76, and 78 provide for storing and forwarding data to the ASIC and CPU chips and to the facsimile and e-mail data streams. D/A block 88 is an analog to digital converter which converts the fax image data stream to digital format and vice versa. Block 80 provides compression/ decompression operations on the data streams. USART block 90 is a universal asynchronous transmitter/receiver chip for transferring the keypad 52 entered commands to the foregoing components and to the displays 94 and 96. which indicate system status. A voice chip 92 and speaker 98 and auxiliary port may also be provided. The fax machine and POTS lines are connected through standard RJ11 connectors. The power supply 30, which may be housed within ecom 16 if desired as shown in Fig. 8, takes standard 110 volt AC power and converts it to the necessary line tone/ring generator, DC and other voltages necessary for running the ecom 16. An on/off switch 100 turns the ecom on and off.

Referring now to Fig. 9 the keypad 52 has the usual QWERTY keyboard and the usual numerals 1 through 0. In addition there are provided special function keys that combine several key stroke commands of the usual computer into single stroke keys for the particular functions. Thus the @ key, the Dot key, for addressing e-mail; COM for commercial, NET for network, EDU for education, ORG for other organizations, MIL for military, and GOV for government, provide quick accurate domain addressing; SEND MAIL, GET MAIL, PREVIEW MAIL, DELETE MAIL, PRINT, for the obvious operations and CONFIDENTIAL for coding transmissions are also provided.

To send a fax from a local to a remote fax machine over the Internet Global Area Network according to the present invention the following dynamic sequence takes place:

The user inputs the e-mail address of the selected
5 remote fax machine via the keypad 52. The LCD 94 displays,
via the USART 90 this input. The user then depresses the
SEND MAIL key. If native fax data is present in the memory
buffer the CPU instruction set begins conversion of the data
together with the ASIC 64 into e-mail Mail User Agent
10 format. If no native fax data is present in memory then the
LCD94 displays a "waiting for fax" default message. The
transformed data is compressed via box 80 and the CPU checks
to see if encryption is indicated. If encryption is
required the CPU instructs the ASIC 64 with EPROM 70 to
15 perform the encryption and stores the result in memory. The
LCD 94 then indicates "mail is ready for delivery". The
user then presses SEND MAIL again and the CPU retrieves the
e-mail server telephone number stored in EPROM or RAM and
initializes modem 84, converter 88 and DSP 82 and via the
20 LTG 86 dials the proper phone number. After the proper
return codes and hand shake is completed with the e-mail
server the CPU sends the e-mail stored in the buffer and
clears the buffer. Upon receipt of proper server return
codes that the message has been received the CPU instructs
25 the modem 84 to close and the ecom is returned to ready for
further traffic.

At the receiving end after transitting the Internet
Global Area Networks the data manipulation sequence in the
remote ecom is essentially the reverse of that just
30 described. In addition a user of the ecom can query its
mail server to see if there is fax e-mail waiting that could
not be delivered previously. Also e-mail other than
converted fax image data can be printed out on a fax machine
attached to an ecom device. The user presses GET MAIL which
35 displays the command on LCD 94 and then the CPU instructs
the appropriate EPROM to retrieve the appropriate server
phone number and to dial same via the modem 86. After

proper identification and handshake if there is mail the server will send it to the MUA EPROM 70 and the CPU will then send it to memory buffer and terminate connection to the server. The usual "preview mail" capability can also be
5 included in ecom 16 if desired.

While there are given above certain specific examples of this invention and its application in practical use, it should be understood that they are not intended to be exhaustive or to be limiting of the invention. On the
10 contrary, these illustrations and explanations herein are given in order to acquaint others skilled in the art with this invention and the principles thereof and a suitable manner of its application in practical use, so that others skilled in the art may be enabled to modify the invention
15 and to adapt and apply it in numerous forms each as may be best suited to the requirement of a particular use.

WHAT IS CLAIMED:

- 1 1. An apparatus for transmitting and receiving class 1, 2,
2 and 3 facsimile image data over Internet Global Area
3 Networks which comprises:
4 signal recognition means for determining send/receive
5 status information;
6 an image data compression, store and forward buffer
7 means connected to said recognition means;
8 conversion means for changing fax image data to
9 electronic mail format data and vice versa connected to said
10 buffer means;
11 an electronic mail agent connected to said conversion
12 means;
13 user identification means for store/send/receive
14 functions connected to said electronic mail agent;
15 electronic management means for address/send/receive
16 instruction, control, and status of apparatus connected to
17 said user identification means; and
18 output means connected to said electronic management
19 means for storing /dialing/connecting said apparatus to a
20 mail server for said electronic mail agent resident on the
21 selected Internet Global Area Networks.
- 1 2. An apparatus according to claim 1 further including
2 encryption means connected to said conversion means and said
3 electronic mail agent for selectively encoding/decoding said
4 converted electronic mail data.
- 1 3. An apparatus according to claim 2 further including a
2 public/ private two key encryption/decryption means together
3 with means for accessing and retrieving a public key from a
4 private address book.

1 4. An apparatus according to claim 1 wherein said
2 electronic mail agent is a commercial mail agent and said
3 mail server resident on the Internet Global Area Network is
4 a commercial server for said agent.

1 5. An apparatus according to claim 1 wherein said
2 electronic mail agent is a public mail agent and said mail
3 server resident on the global area network is a public
4 server.

1 6. An apparatus according to claim 1 wherein said output
2 means includes store/dial/connect circuitry to operatively
3 connect the apparatus via said mail server resident on the
4 Internet Global Area Network to a remote mail agent
5 connected via a remote mail server to said Internet Global
6 Area Network.

1 7. An apparatus according to claim 6 wherein said
2 electronic management means includes a keypad input device
3 having at least send/receive functions; fax and e-mail
4 address functions; and mail server, private address book,
5 and fax machine query functions for commanding operation of
6 said apparatus.

1 8. An apparatus according to claim 7 further including an
2 RJ 11 input terminal connected to said signal recognition
3 means for operatively connecting said apparatus to a class
4 1,2, or 3 facsimile machine standard output terminal.

1 9. An apparatus according to claim 8 further including an
2 RJ 11 output terminal connected to said output means for
3 operatively connecting said apparatus via a POTS line to
4 said mail server resident on the Internet Global Area
5 Network.

1 10. An apparatus according to claim 9 wherein said
2 apparatus is powered by a separate DC voltage power supply
3 operatively connected thereto and adapted to be connected to
4 a standard commercial AC power source.

1 11. An apparatus according to claim 1 wherein said
2 conversion means includes electronic means for
3 attaching/detaching native facsimile images to the
4 electronic mail format data created by said conversion means
5 for transmission/reception over the Internet Global Area
6 Network.

1 12. An apparatus according to claim 11 wherein said
2 electronic means includes e-mail extender MIME protocol.

1 13. An interface apparatus system for transmitting
2 facsimile images from a first, class 1, 2, or 3 fax machine
3 across the Internet Global Area Network to a second, class
4 1, 2, or 3 fax machine which comprises in combination:
5 a first device connected between a first fax machine
6 and a local mail server resident on the Internet Global Area
7 Network comprising;
8 signal recognition means connected to said first fax
9 machine for determining send/receive status information;
10 an image data compression, store and forward buffer
11 means connected to said recognition means;
12 conversion/deconversion means for changing fax image
13 data to electronic mail format data and vice versa connected
14 to said buffer means;
15 an electronic mail agent connected to said conversion
16 means;
17 user identification means for store/send/receive
18 functions connected to said electronic mail agent;
19 electronic management means for address/send/receive
20 instruction, control, and status of apparatus connected to
21 said user identification means; and

22 output means connected to said electronic management
23 means for storing /dialing/connecting said apparatus to said
24 local mail server resident on the Internet Global Area
25 Network;

26 a second device connected between a second remote fax
27 machine and a remote mail server resident on the Internet
28 Global Area Network comprising;

29 signal recognition means connected to said remote fax
30 machine for determining send/receive status information;

31 an image data compression/decompression, store and
32 forward buffer means connected to said recognition means;

33 conversion means for changing fax image data to
34 electronic mail format data and vice versa connected to said
35 buffer means;

36 an electronic mail agent connected to said conversion
37 means;

38 user identification means for store/send/receive
39 functions connected to said electronic mail agent;

40 electronic management means for address/send/receive
41 instruction, control, and status of apparatus connected to
42 said user identification means; and

43 output means connected to said electronic management
44 means for storing /dialing/connecting said second device to
45 said remote mail server resident on the Internet Global Area
46 Network;

47 whereby input to said first fax machine can be
48 transmitted to said second fax machine over the Internet
49 Global Area Network and input to said second fax machine can
50 be transmitted to said first fax machine over the Internet
51 Global Area Network.

1 14. An apparatus system according to claim 13 further
2 including encryption/decryption means connected to said
3 conversion means and said electronic mail agents of each of
4 said first and second devices for selectively
5 encoding/decoding said converted electronic mail format
6 data.

1 15. An apparatus system according to claim 14 further
2 including a public/ private two key encryption/decryption
3 means together with means for accessing and retrieving a
4 public key from a private address book.

1 16. An apparatus system according to claim 13 wherein said
2 mail agents and said mail servers of said first and second
3 devices are commercial mail agents and commercial mail
4 servers resident on the Internet Global Area Network.

1 17. An apparatus system according to claim 13 wherein said
2 electronic management means in said first and second devices
3 includes a get mail query means for getting electronic mail
4 stored in said local and remote mail servers printed out on
5 said first and second class 1, 2, and 3 fax machines.

1 18. An apparatus system according to claim 17 wherein said
2 query means includes mail preview means for reviewing stored
3 mail and printing out only selected items.

1 19. A system for transmitting/receiving class 1, 2, or 3
2 facsimile image data over the Internet Global Area Network
3 which comprises an apparatus connected to the output of a
4 fax machine having the following components operatively
5 connected together on a bus between said fax machine input
6 and a POTS line output:

7 an analog to digital converter for converting a fax
8 image data signal to a digital format;

9 high speed RAM for storing and forwarding native fax
10 data to CPU and ASIC means for conversion to e-mail data
11 streams;

12 a plurality of digital signal processors for formatting
13 said data streams;

14 at least one EPROM containing an commercial, private,
15 and/or public e-mail agent;

16 a universal asynchronous transmitter/receiver keypad
17 for addressing, encoding and operating data input and a
18 display module for displaying status;

19 an ASIC chip programmed with translation algorithms
20 for converting phase C11 data into commercial and or public
21 e-mail format, both forward and reverse directions;

22 at least one AD/DA converter;

23 a transmitting modem and a receiving modem;

24 a line tone/ring generator; and

25 a CPU controlling and directing the flow and processing
26 of data within the system.

1 20. A system according to claim 19 further including a
2 flash EPROM containing signature and encryption/decryption,
3 two key algorithms for the coding/decoding of facsimile to
4 facsimile, e-mail to facsimile, and facsimile to e-mail data
5 streams.

1 21. A system according to claim 20 wherein said EPROM
2 contains a public key query instruction set.

1 22. Apparatus for transmitting/receiving encrypted class
2 1, 2, or 3 facsimile images over telephone lines from a
3 local fax machine to a selected remote fax machine which
4 comprises:

5 signal recognition means for determining send/receive
6 status information connected to a local fax machine;

7 an image data compression/decompression, store and
8 forward buffer means connected to said recognition means;

9 public/private two key encryption/decryption means
10 connected to said buffer for encrypting fax image data
11 stored therein;

12 means for accessing a public key address book connected
13 to said buffer;

14 electronic management means for address/send/receive
15 instruction, control, and status of apparatus connected to
16 said local fax machine;

17 output means connected to said management means and a
18 telephone line for storing/dialing/connecting said apparatus
19 to a selected remote fax machine;

20 signal recognition means for determining send/receive
21 status information connected to said selected remote fax
22 machine;

23 an image data compression/decompression, store and
24 forward buffer means connected to said recognition means
25 connected to said selected remote fax machine;

26 public/private two key encryption/decryption means
27 connected to said remote buffer for decrypting fax image
28 data stored therein;

29 means for accessing a public key address book connected
30 to said remote buffer;

31 electronic management means for address/send/receive
32 instruction, control, and status of apparatus connected to
33 said remote fax machine for controlling the reception,
34 verification, decoding, and print out of the fax image data
35 received.

1 23. The method of transmitting/receiving class 1, 2, or 3
2 fax machine image data over non-fax image data compatible
3 networks from a local fax machine to a selected remote fax
4 machine and vice versa which comprises:

5 storing the image data stream from a local transmitting
6 class 1, 2, or 3 fax machine in a local store and forward
7 buffer;

8 converting the image data stream in said buffer to a
9 data format compatible with the network over which the fax
10 data is to be sent;

11 connecting a local mail agent directly to said store
12 and forward buffer and to a server for said agent resident
13 on the network over which the fax is to be sent;

14 connecting a store and forward buffer to said selected
15 remote fax machine;

16 connecting a remote mail agent to said remote buffer
17 and a remote mail agent server resident on the network over
18 which the fax is to be sent;

19 sending said converted image data stream over said non
20 fax image data compatible network together with address and
21 user identification information to said selected remote mail
22 server resident at a remote location on said network serving
23 said selected remote mail agent;

24 receiving and storing said data stream in said remote
25 store and forward buffer, connected to said selected remote
26 fax machine;

27 reconverting said received and stored non-fax image
28 data stream into class 1, 2, or 3 fax machine image data;

29 printing out said reconverted image data on said
30 selected remote class 1, 2, or 3 fax machine.

1 24. The method as claimed in claim 23 further including
2 querying said remote mail server for the presence of stored
3 mail data; and

4 printing out on said remote fax machine said
5 reconverted image data for the mail data selected from that
6 stored in said remote mail server.

1 25. The method as claimed in claim 23 further including
2 converting the image data stream in said local buffer to
3 commercial compatible data format; and
4 connecting a commercial mail agent to said buffer
5 directly and to a commercial mail server resident on the
6 network over which the fax is to be sent.

1 26. The method as claimed in claim 23 further including
2 converting the image data stream from a local transmitting
3 class 1, 2, or 3 fax machine to an e-mail data stream
4 format;
5 connecting said local mail agent to an e-mail server
6 resident on the Internet Global Area Network; and
7 sending said converted e-mail data stream to said
8 selected remote fax machine buffer over the Internet Global
9 Area Network.

1 27. The method as claimed in claim 23 further including
2 converting the fax image data stream from a local
3 transmitting class 1, 2, and 3 fax machine to a private data
4 stream format;
5 connecting said local mail agent to a private server
6 resident on the Internet Global Area Network; and
7 sending said converted private data stream to said
8 selected remote fax machine buffer over the Internet Global
9 Area Network.

1 28. The method as claimed in claim 23 further including
2 converting the image data stream in said buffer to
3 commercial and public compatible data format;
4 connecting said buffer to a selected commercial or
5 public mail agent and corresponding mail server resident on
6 the Internet Global Area Network;
7 sending said converted image data stream over the
8 Internet Global Area Network to a remote mail server and
9 mail agent corresponding in kind to the selected commercial
10 or public mail agent and server at the sending fax machine;
11 and
12 connecting said selected remote commercial or public
13 mail agent to said store and forward buffer connected to
14 said selected remote fax machine.

1 29. The method as claimed in claim 23 further including
2 encrypting the converted image data stream;
3 sending said encrypted converted data stream to said
4 selected remote mail server agent and
5 decrypting said received and stored data stream in said
6 remote buffer before reconverting said data stream to fax
7 image data.

1 30. In a system for transmitting/receiving class 1, 2, or
2 3 fax machine data over non fax image data compatible
3 networks connecting a local fax machine to a selected remote
4 fax machine having fax image processing apparatus connected
5 at the local and remote fax machines comprising;

6 signal recognition means for determining send/receive
7 status information;

8 an image data compression, store and forward buffer
9 means connected to said recognition means;

10 conversion means for changing image data to electronic
11 mail data format and vice versa connected to said buffer
12 means;

13 an electronic mail agent connected to said conversion
14 means;

15 encryption means connected to said conversion means and
16 said electronic mail agent for selectively encoding/decoding
17 said converted electronic mail data and having a public/
18 private two key encryption/decryption means together with
19 means for accessing and retrieving a public key from a
20 private address book;

21 user identification means for store/send/receive
22 functions connected to said electronic mail agent;

23 electronic management means for address/send/receive
24 instruction, control, and status of apparatus connected to
25 said user identification means; and

26 output means connected to said electronic management
27 means for storing /dialing/connecting said apparatus to a
28 mail server resident on a global area network:

29 the method of sending encrypted fax image data from a
30 local to a remote fax machine which comprises:

31 bypassing at both the local and remote locations all
32 the fax image data processing apparatus except the
33 encryption/decryption, signal recognition, buffer, electronic
34 management and output means apparatus; and

35 connecting said local fax machine and said selected
36 remote fax image data processing apparatus together over a
37 POTS line.

1 31. The method of receiving electronic mail on class 1, 2,
2 and 3, fax machines which comprises the steps of:
3 connecting a store and forward buffer to a class 1, 2,
4 or 3 fax machine;
5 connecting said store and forward buffer to a local
6 electronic mail agent and then to a mail server for said
7 local mail agent resident on an e-mail network;
8 receiving and storing an e-mail message data stream
9 from said local mail agent in said store and forward buffer;
10 converting said received and stored e-mail data stream
11 into a class 1, 2, or 3 fax machine image data stream;
12 printing out said reconverted image data stream on
13 said class 1, 2, and 3 fax machine.

1 32. An apparatus as claimed in claim 1 wherein said
2 electronic management means includes an electronic keyboard
3 having at least the following operating keys:
4 a QWERTY keyboard;
5 a 1 through 0 keyboard;
6 domain keys COM, NET, EDU, ORG, GOV, and MIL;
7 function keys SEND MAIL, GET MAIL, PREVIEW MAIL, DELETE
8 MAIL, CONFIDENTIAL, and PRINT;
9 addressing keys @, DOT;
10 each of said keys causing upon actuation all the
11 necessary electronic operations for accomplishing the
12 indicated command within the apparatus.

1 33. An apparatus according to claim 3 wherein said
2 encryption/decryption means includes an attachment MIME/MOSS
3 extender.

1/7

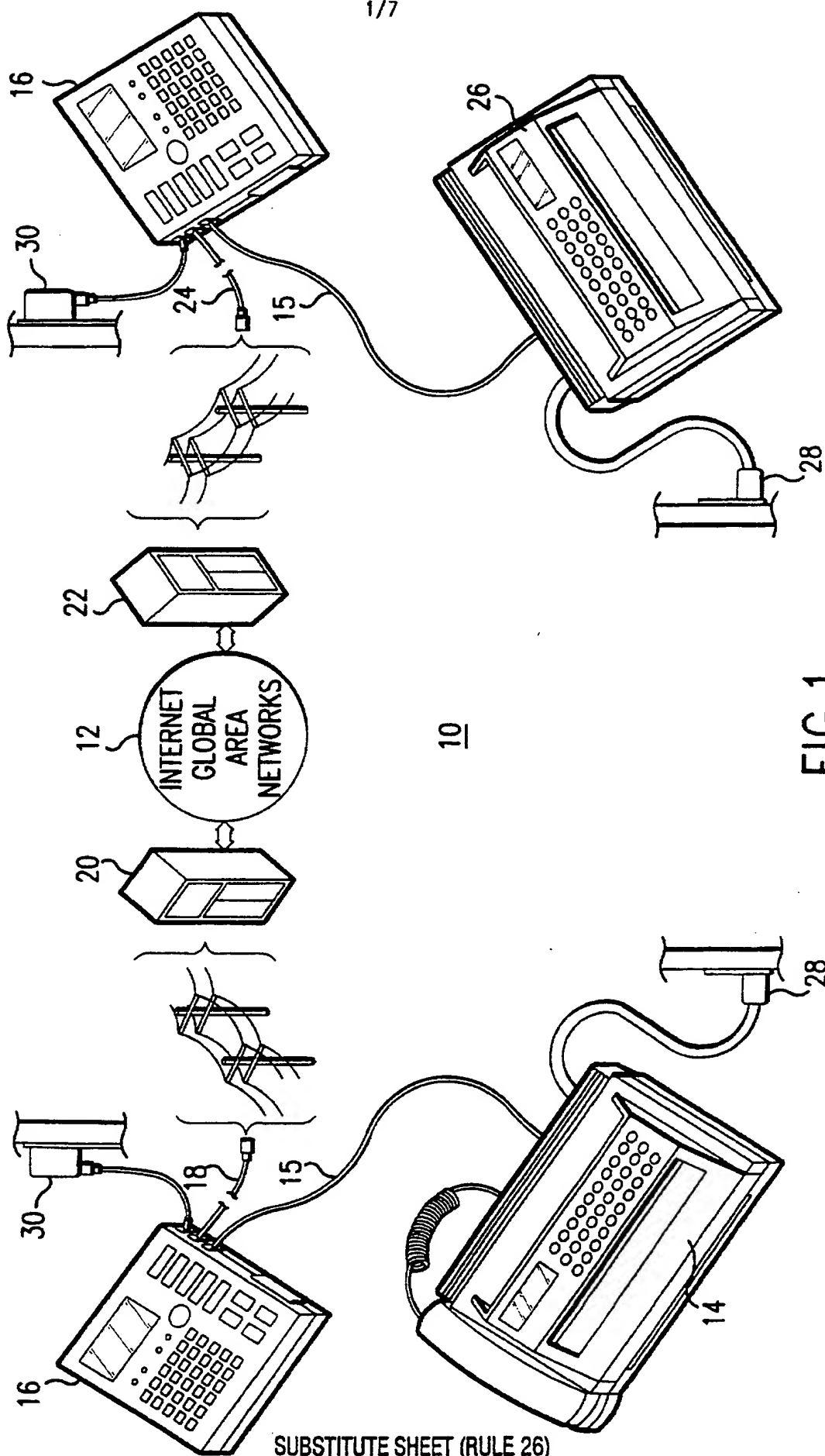


FIG. 1

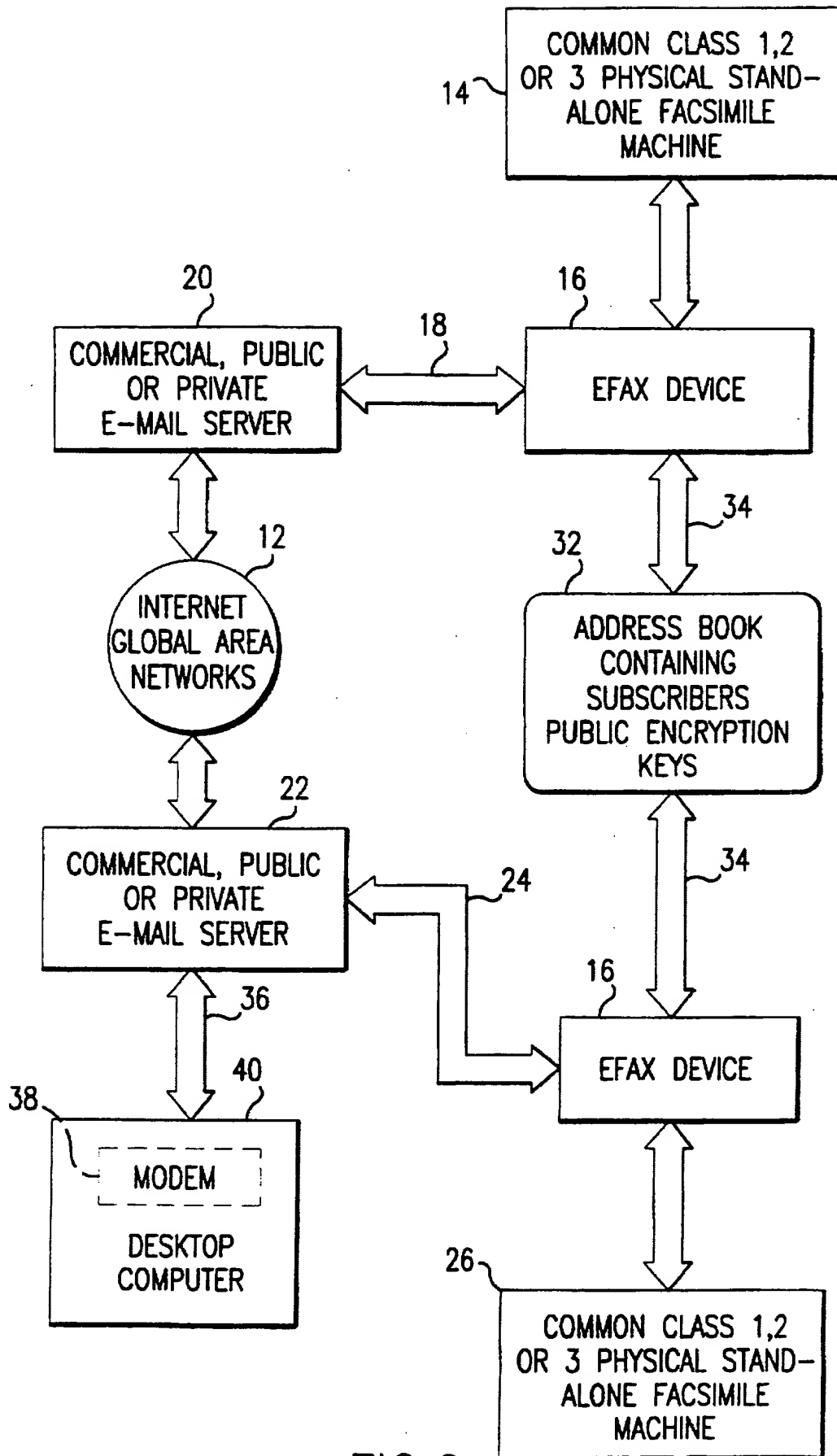


FIG.2

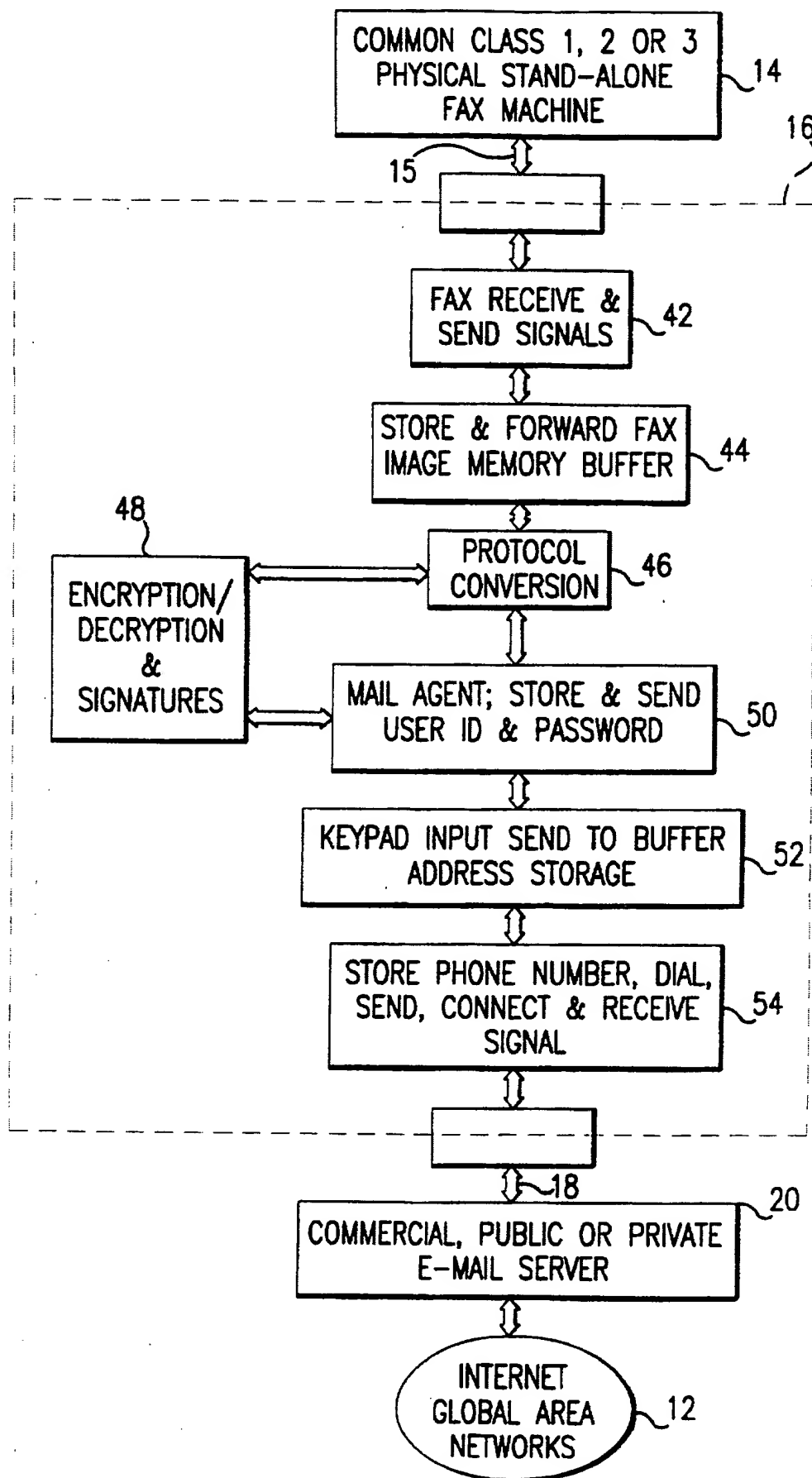


FIG. 3

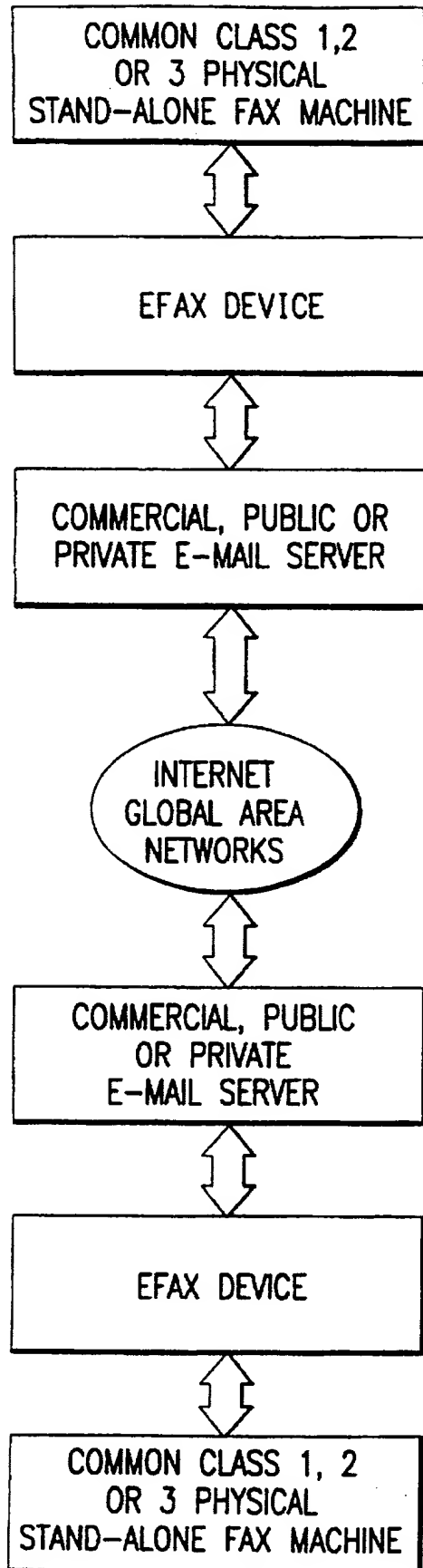


FIG. 4

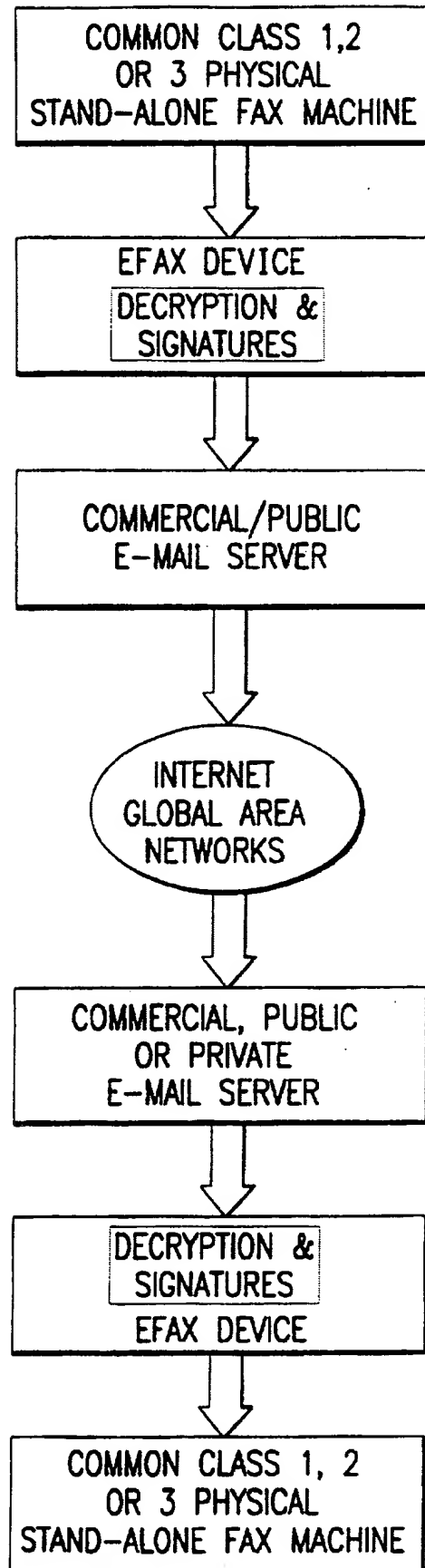


FIG. 5

5/7

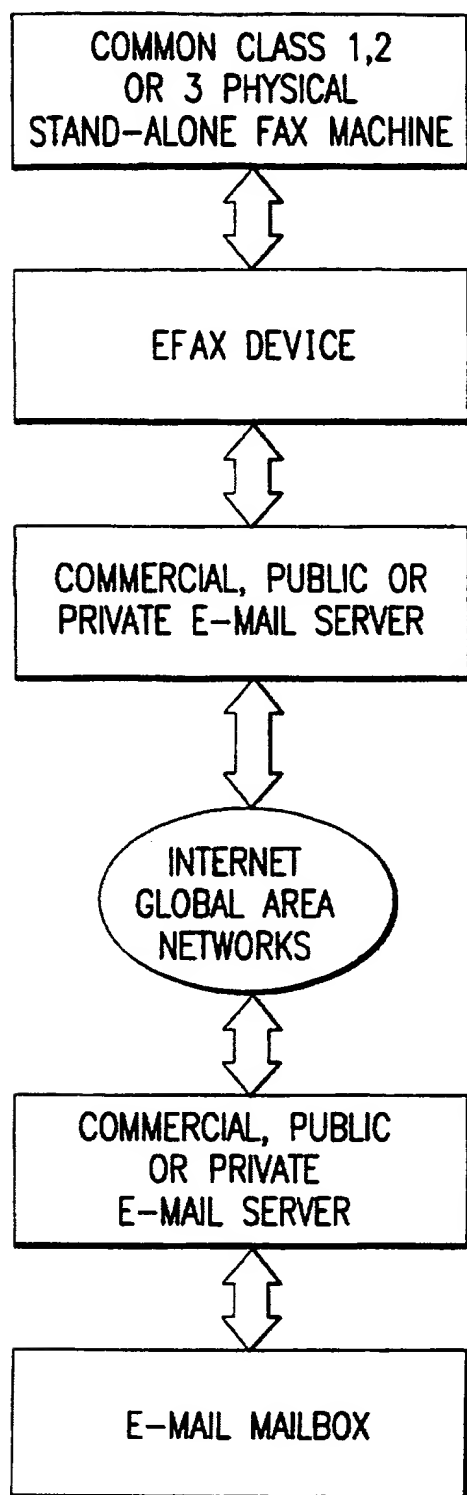


FIG. 6

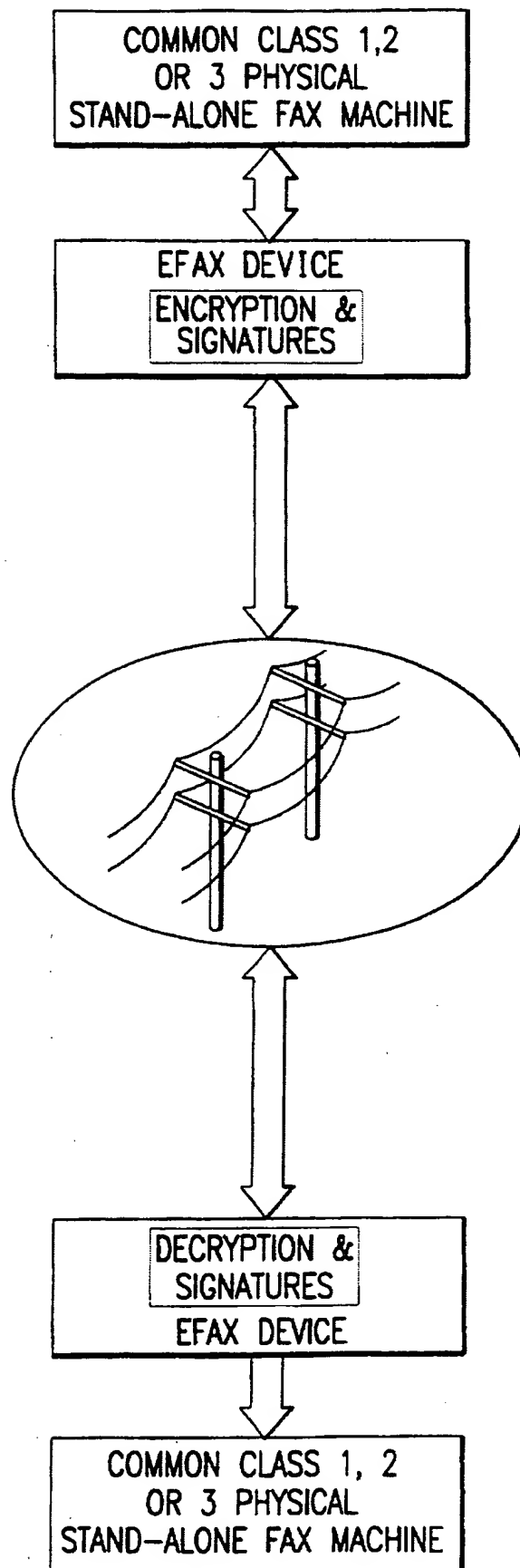
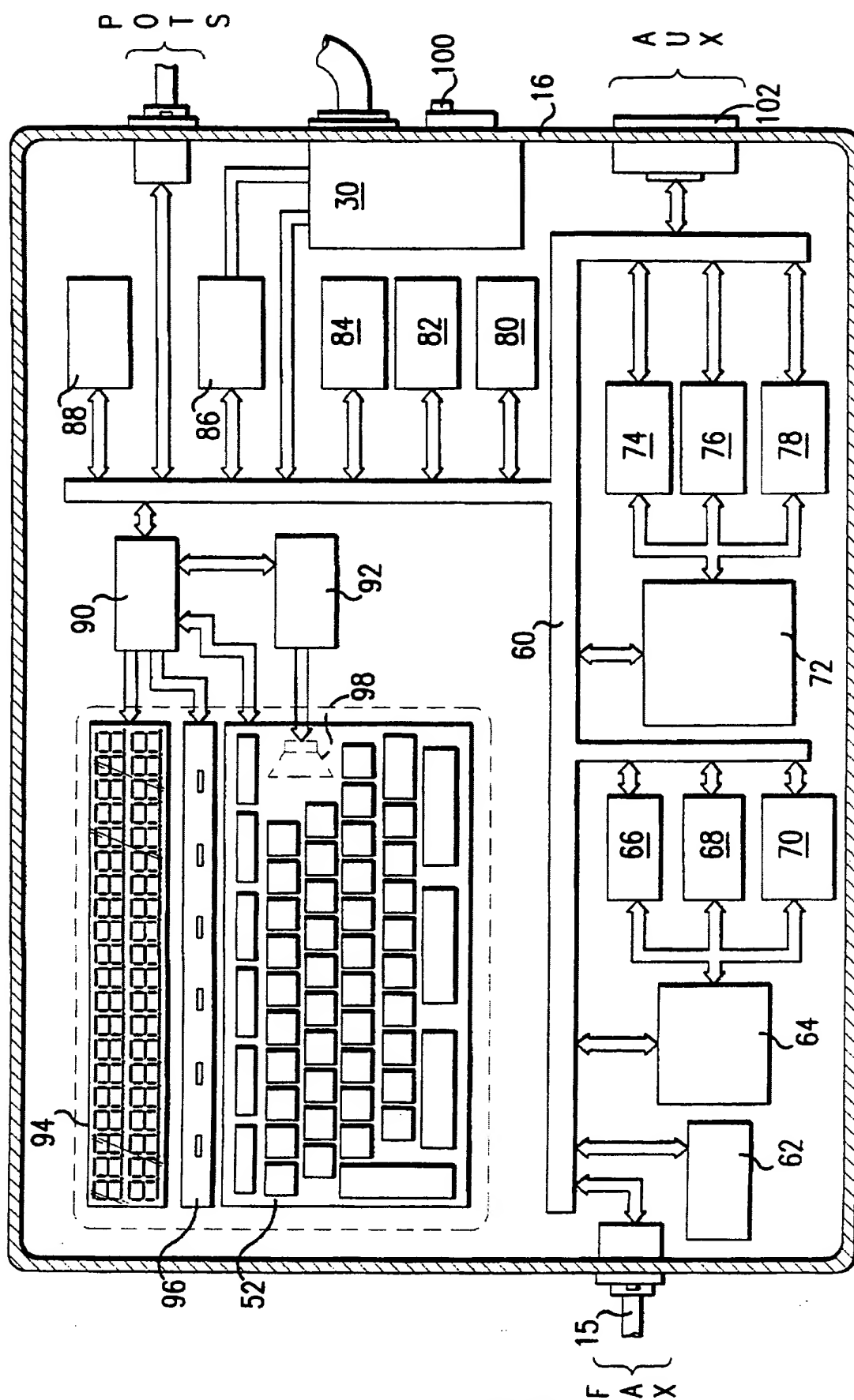


FIG. 7



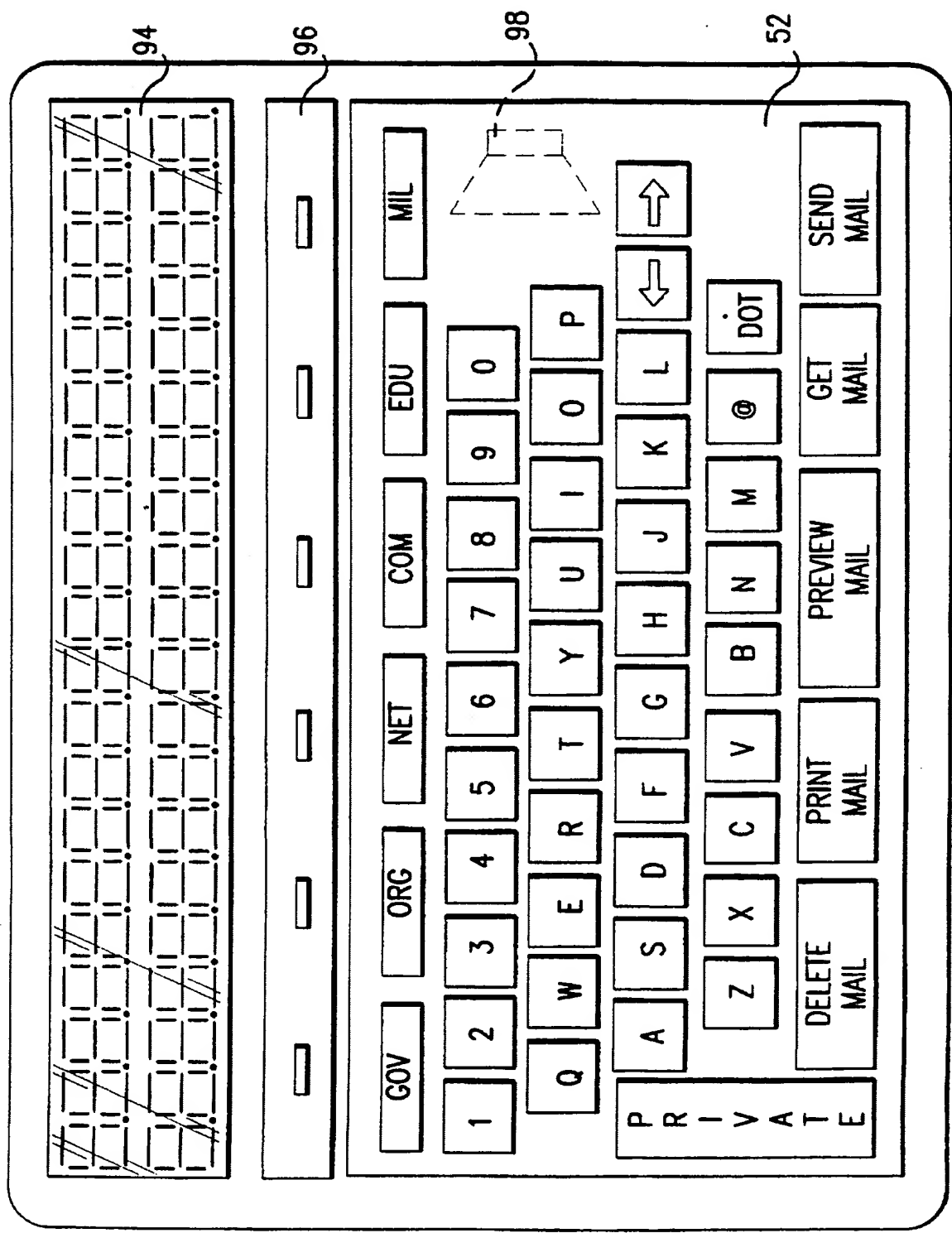


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/17259

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H04N 1/00, 1/32

US CL : 358/402, 407, 442, 443

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category ^a	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US, A, 5,091,790 (SILVERBERG) 25 FEBRUARY 1992, col. 1-6.	1-3, 6-8, 15-19, 21-22, 24-26, 28-29, 31-32, 34 ----- 4-5, 9-14, 27, 35-36
X --- Y	US, A, 4,941,170 (HERBST) 10 July 1990, col. 5, line 46, to col. 8, line 57.	1-3, 6-8, 15-19, 21-22, 24-27, 28-29, 31-32, 34, 36 ----- 4-5, 9-14, 35- 34

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

^a	Special categories of cited documents:	^T	later document published after the international filing date or priority date and not in conflict with the application but cited to underlain the principle or theory underlying the invention
^A	document defining the general state of the art which is not considered to be part of particular relevance	^X	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
^E	earlier document published on or after the international filing date	^Y	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
^L	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	^g	document member of the same patent family
^O	document referring to an oral disclosure, use, exhibition or other means		
^P	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

30 DECEMBER 1996

Date of mailing of the international search report

31 JAN 1997

 Name and mailing address of the ISA/US
 Commissioner of Patents and Trademarks
 Box PCT
 Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

SCOTT A. ROGERS

Telephone No. (703) 308-8576

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/17259

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category ^o	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X --- Y	US, A, 5,406,557 (BAUDOIN) 11 April 1995, col. 8, lines 24-38, col. 10, lines 3-17.	1-3, 6-8, 15-19, 21-22, 24-26, 28- 29, 31-32, 34 ----- 4-5, 9-14, 27, 35-36
X, P --- Y	US, A, 5,479,411 (KLEIN) 26 December 1995, col. 4, line 20, to col. 6, line 23.	1-3, 6-8, 15-26, 28-34 ----- 4-5, 9-14, 27, 35-36

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/17259

B. FIELDS SEARCHED

Minimum documentation searched

Classification System: U.S.

358/402, 407, 442, 443, 468, 440, 434; 379/100, 93, 94; 395/200.04, 200.18

H04N 1/00, 1/32